Relationships on the Rocks:

A Meta-analysis of Romantic Partner Effects on Alcohol Use

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Abstract

The partner influence hypothesis postulates one partner's alcohol use influences the other partner's alcohol use over time. While several studies have examined the partner influence hypothesis, the magnitude and gender-specific nature of partner influences on alcohol use are unclear and have yet to be examined meta-analytically. We addressed this by conducting a traditional bivariate meta-analysis and two-stage meta-analytic structural equation modelling (TS-MASEM) across 17 studies ($N = 10{,}553$ couples). Studies that assessed both romantic partners' alcohol use at a minimum of two time-points were selected. Results suggest romantic partners do influence one another's drinking, to a small but meaningful degree, with women ($\beta = .19$) exerting a statistically stronger ($p < .05$) influence than men ($\beta = .12$). Results also suggest time lag between assessment, alcohol indicator, married, and year of publication may moderate partner influence. Thus, social influences on individual alcohol use include important partner influences. These influences can serve either risk or protective functions. Given the economic, social, and health consequences associated with alcohol misuse, advancing knowledge of social risk factors for alcohol misuse is essential. Therefore, assessment and treatment of alcohol misuse should extend beyond the person to the social context. We encourage clinicians to consider involving romantic partners when assessing and treating alcohol misuse.

Keywords: alcohol, romantic relationships, dating, married, meta-analysis.

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Alcohol use is widespread in North America. In 2016, 70.1% of American adults reported drinking alcohol, and in 2013, 80% of Canadian adults reported alcohol use (Substance Abuse and Mental Health Services Administration, 2017; Public Health Agency of Canada [PHAC], 2016). Despite the prevalence and general acceptance of alcohol use in North America, there are numerous adverse outcomes associated with alcohol misuse. Indeed, alcohol use cost the United States $249 billion in 2010 and represented the second-costliest substance; three-quarters of these costs were associated with binge drinking (National Institute on Drug Abuse, 2017; Sacks, Gonzales, Bouchery, Tomedi, & Brewer, 2015). In 2014, alcohol use cost Canada $14.1 billion and represented the costliest substance (Canadian Centre for Substance Use and Addiction, 2018). The social costs of alcohol misuse include damaged relationships, family conflict, violence, and impaired driving (PHAC, 2016). Moreover, there are over 200 health conditions linked with excessive alcohol use, including gastrointestinal diseases, cancers, and cardiovascular diseases (World Health Organization, 2014).

Alcohol is frequently consumed socially and often associated with positive social experiences (PHAC, 2016); therefore, individuals' alcohol use may be influenced by others in their environment. Research shows drinking-supportive social networks have a strong influence on individual alcohol misuse and alcohol problems over time (Homish, & Leonard, 2008). One potentially important social influence on alcohol use occurs in the context of romantic relationships (Homish, & Leonard, 2007). Research on alcohol use in romantic couples is essential since alcohol use is implicated in several key aspects of romantic relationships, including marital satisfaction, partners' emotional well-being, and domestic violence. Spouses of individuals with alcohol use disorders (AUDs), for example, report lower marital satisfaction and elevated depression, anxiety, and psychological distress compared to spouses of individuals without AUDs (Rodriguez, Neighbors, & Knee, 2014). Furthermore, heavy alcohol use within romantic couples may be associated with other negative social consequences such as relationship dissolution (Torvik, Røysamb, Gustavson, Idstad & Tambs, 2013).

Though the impact of heavy partner drinking has garnered much attention, the impact of a partner's alcohol use on an individual's subsequent alcohol use is unclear. Though data exist that would allow for a large-scale empirical evaluation of partner influences on alcohol use, these data have not been empirically synthesized. Research on the role of partner alcohol use on subsequent use in romantic couples is important, given the numerous negative consequences of alcohol misuse noted above. We addressed this gap in the literature by synthesizing findings of longitudinal studies that examined alcohol use in couples.

Partner Influence Hypothesis

The partner influence hypothesis (Mushquash et al., 2013) postulates one partner's alcohol use influences the other partner's alcohol use over time. This hypothesis stems from earlier research on spousal concordance in alcohol use (e.g., Leonard & Eiden, 1999; Leonard & Senchak, 1993; Yamaguchi & Kandel, 1993). Several theories help explain why partner influences might be operative. One pertains to social conformity pressure, which research on interpersonal influences has identified as a predictor of alcohol use and misuse (Fairlie, Wood, & Laird, 2012). Similarly, social impact theory (Latané, 1981) postulates that as the importance of individuals within one's social context increases, and as time spent with the social network increases, the more likely an individual will conform to the social network's normative pressures. A romantic partnership is an example of an important relationship where individuals can be subjected to pressures to conform. Likewise, interdependence theory posits that as individuals in romantic relationships build their partnership through rewarding interactions, they become increasingly dependent on one another (Wickham & Knee, 2012) and, therefore, more susceptible to being influenced by one other's behaviors.

Furthermore, given the human need for social approval and acceptance (Baumeister & Leary, 1995), partners in a romantic relationship may change their drinking behaviors to match those of their romantic partner to receive partner approval and thereby maintain the relationship (Mushquash et al., 2013). According to family systems theory, couples respond to each other's behaviors within a system established by roles and expectations (Bowen, 1974). Partners may shift their drinking behaviors to maintain balance in the family system.

Following the theory of exposure effects in person perception (Moreland & Zajonc, 1982), since partners are highly exposed to one another, they are likely to develop positive attitudes toward one another's drinking behavior and therefore adopt similar drinking behaviors. Yet another theory that may explain partner influences involves the notion of a "drinking partnership" (Roberts & Leonard, 1998) – an accord between the partners' drinking levels, patterns, or contexts of use that is suggested to develop over time in some couples. Such couples may develop enduring drinking rituals, especially when alcohol becomes an integral part of the relationship. Next, following Bandura's (1977) social learning theory, one individual may imitate their partner's ("model's") drinking after a period of directly observing the rewards their partner obtains from drinking.

In line with the robust literature of homophily in social networks, partners are likely to select individuals who engage in similar drinking behaviors (Leonard & Mudar, 2003; McPherson, Smith-Lovin, & Cook, 2001). However, research on substance use over the transition to marriage has demonstrated that selection effects do not account for all the differences observed in alcohol use between married and single individuals (Labouvie, 1996; Merline, 2004). Similarly, Aikins, Simon, and Prinstein (2010) found both selection and partner influence effects on alcohol use in adolescent romantic partnerships. In sum, various theories help explain the mechanisms through which partner influence effects might operate, and they converge in suggesting partners may adopt one another's drinking behaviors over time. Alternatively, a negative association between partners' drinking may exist (e.g., in social learning theory, when an actor observes punishing consequences following the drinking behaviour of their partner, they may decrease their own drinking). Moreover, the direction or strength of partner influences may be impacted by moderating factors including couple age or relationship length. The partner influence hypothesis and its related theories imply that couples who fail to influence each other's drinking may be at risk of lower relationship satisfaction or relationship dissolution.

Advancing research on the partner influence hypothesis using meta-analysis

Despite sustained research, the magnitude and gender-specific nature of partner influences on alcohol use are unclear. Correlations between a partner's baseline alcohol use and an individual's own subsequent alcohol use range from small (r = .25; Otten, van der Zwaluw, van der Vorst, & Engels, 2008) to large (r = .55; Bartel, Sherry, Molnar, Mushquash, Leonard, Flett, & Stewart, 2017). Moreover, Leonard and Mudar (2004) found the direction of gender-specific spousal influence changed over time: husbands influenced wives from the pre-marriage period to the first year of marriage, but wives influenced husbands from the first year of marriage to the second. Other studies found partner influences on alcohol use are equal for women and men (e.g., Bartel et al., 2017).

A thorough understanding of partner influences on alcohol misuse is beneficial for validating existing efforts to incorporate social network drinking in biopsychosocial assessment settings (e.g., American Society of Addiction Medicine, 2015) and for improving intervention efforts. For instance, if robust partner influences exist, then partner drinking should continue to be assessed when establishing a prognosis or treatment plan for an alcohol misusing client. If the partner's drinking level is high, it may hinder the efficacy of an individual's treatment, or impede the individual's change in drinking behavior. However, if a partner's drinking is low, it may bode well for recovery, reinforce the efficacy of an individual's treatment, and accelerate change in the individual's alcohol use. Therefore, a clinician could harness the therapeutic potential of a client having a low-drinking partner or could treat the couple together in the case of a heavy-drinking partner.

Given the useful clinical implications of the partner influence hypothesis, a synthesis of available data on this hypothesis is valuable. This would allow the implementation of statistical controls (e.g., controlling for actor effects – i.e., relative stability in the individual's own drinking behavior over time) and robust testing of gender differences (e.g., to test whether the magnitude of partner influence is statistically stronger in one vs. the other gender) that are missing from many studies (e.g., Gudonis-Miller, Lewis, Tong, Tu, & Aalsma, Carpentier, Azzouz, & Fortenberry, 2012). We used two-stage meta-analytic structural equation modeling (TS-MASEM) in addition to traditional meta-analyses. The tendency to rely solely on traditional meta-analyses in psychology is limiting; studies often examine multiple and correlated outcomes even though effects are often multivariate rather than univariate (Eysenck, 1994; Jackson, Riley & White, 2011). Instead of performing multiple traditional analyses, multivariate meta-analyses such as TS-MASEM provide all parameter estimates within a single model (e.g., testing both actor and partner effects simultaneously instead of performing separate analyses). Furthermore, TS-MASEM can assess models' fit and estimate effects while controlling for other variables and is the preferable approach to permit integration of meta-analysis and structural equation modeling (Cheung & Hong, 2017; Landis, 2013).

Objectives and Hypotheses

We tested whether one partner's baseline alcohol use predicted changes in the other partner's alcohol use by follow-up, by conducting TS-MASEM (Cheung, 2005). Despite some inconsistencies in the literature, overall, research does suggest the presence of partner effects over time (e.g., Aalsma et al., 2012; Van der Wulp, Hoving, & De Vries, 2015). Therefore, we expected to observe robust partner effects. We hypothesized that after accounting for individual baseline alcohol use, that an individual's future alcohol use would be significantly and positively predicted by their partner's baseline alcohol use. Our test of the magnitude of partner influence was exploratory. Additionally, we investigated whether the magnitude of partner influences differ by alcohol indicator by comparing partner effects derived from measures of alcohol use vs. measures of alcohol-related problems. Next, we examined whether partner influences on alcohol use differ in magnitude by gender; however, given inconsistencies in the literature, these analyses were exploratory[1]. Finally, to evaluate publication bias and to catalyze a search for moderators that may resolve heterogeneity, we conducted a traditional meta-analysis to test the moderating effect of year of publication, mean age of couple, alcohol indicator (i.e., measure of alcohol use vs. alcohol-related problems), time lag, married (i.e., predominantly married couples vs. community/dating/other couples), attrition, and relationship length on observed relations.

Method

[1]Our meta-analysis was pre-registered with PROSPERO's International prospective register of systematic reviews (CRD42018089699).

Study Identification

Six databases (i.e., Academic Search Premier, the Cumulative Index of Nursing and Allied Health Literature, PsycINFO, PubMed, and Social Work Abstracts, and Proquest Dissertations and Theses) were searched to locate longitudinal studies of alcohol use in romantic couples. Literature searches were conducted using keywords and Boolean search terms (couple* OR marriage OR married OR marital OR partner* OR dyad* OR spous* OR husband* OR wife OR wives OR boyfriend OR girlfriend OR fiancé OR "common law" OR companion OR dating OR "same-sex relationship*" OR "heterosexual relationship" OR "homosexual relationship" OR "intimate relationship*" OR "committed relationship*" OR "closed relationship*" OR "exclusive relationship*" OR "monogamous relationship*" OR "covenant relationship*" OR "significant other" OR "life partner") AND (alcoho* OR drinking) AND (longitudinal OR "repeated measure" OR "serial measure" OR prospective OR "multi-wave" OR "follow up" OR "over time"). The search was not restricted by year of publication, language, or publication status. Studies were included if they met the following six criteria: the study used a longitudinal design; the study collected data on romantically-involved couples; alcohol use was assessed at baseline; the same measure of alcohol use was assessed at follow-up; both members of the couple's alcohol use was assessed at each wave; and couples remained in the same romantic partnership at each wave. Intervention studies including these six components were eligible if data from an untreated control group were available; in such cases, only the data from the untreated control group were used. We placed no restrictions on study samples with respect to sex, gender, sexual orientation, age, or ethnicity.

The search returned 4,902 studies. After removing duplicates, 3,655 studies remained. The first and fourth authors screened the abstracts for inclusion (agreement rate: 95.1%). Next, two raters reviewed the full text of remaining articles for inclusion (agreement rate: 100.0%). At each stage, rating discrepancies were resolved through discussion and consensus with co-authors. Following full-text screening, the references and publications citing each article that met inclusion criteria were screened. Studies known to the authors that were not detected through the literature search were also screened for inclusion (*n* = 3). Following the addition of these three articles, a total of 26 studies met inclusion criteria, and 17 studies were included in the final analyses (see Supplemental Material A for a sample of excluded studies, and Figure A1 for the PRISMA flowchart of the literature search and study selection; Moher et al., 2009). Information was requested from the primary author (*n* = 18) when a study nearly met criteria but did not report effect sizes or reported insufficient information to compute effect sizes. Nine of the contacted authors provided the requested information (and were thus included in the final 17 articles), whereas another nine of the authors contacted were unable to provide the necessary statistical information (i.e., no longer had access to the data, had already destroyed data). In December 2017, we concluded the literature search and began data extraction.

Coding of Studies

The first and fourth authors coded the 17 included studies using ten characteristics: sample size, type of sample, type of romantic relationship, sexual orientation of the couple, relationship length, mean age of participants, percentage of Caucasian participants, percentage of female participants, publication type, and measure(s) used to assess alcohol outcomes. The characteristics of included studies appear in Table 1.

Measures

Four primary alcohol outcomes were included: frequency, frequency of binge drinking, quantity, and alcohol problems (assessed using one or more of three measures). We refer to these outcomes collectively as "alcohol indicators." For our subgroup analysis, we refer to measures of frequency, frequency of binge drinking, and quantity collectively as "alcohol use," to differentiate from "alcohol-related problems" (see Supplemental Material B).

Procedure

To combat overrepresentation of studies including multiple effects, studies using multiple alcohol indicators had their correlations averaged, so the analysis only included one effect from each included study (Card, 2012). Prior to averaging, correlations were transformed into Fisher's Z (Card, 2012). Correlations within each individual study across every wave available appear in Supplemental Material C. We used all available alcohol indicators data by averaging effects across all waves and interpret effects following Cohen's (1992) guidelines for small, medium, and large effect sizes (r = .10, .30, .50).

Traditional meta-analysis

We used Comprehensive Meta-Analysis (Version 2; Borenstein, Hedges, Higgins, & Rothstein, 2005) to evaluate overall bivariate effects using random-effect models. Weighted mean effects were calculated following procedures recommended by Hunter and Schmidt (1990). To assess heterogeneity, we calculated the total heterogeneity of weighted mean effect sizes (Q_T) and the total variation across studies attributable to heterogeneity (I^2). When Q_T was significant, we used random-effect meta-regressions with maximum likelihood estimations to test the potential moderating effects of five continuous and two categorical covariates: year of publication, mean age of couple, time lag, attrition, relationship length, alcohol indicator, and married. Only continuous moderators evaluated in 10 or more samples and categorical moderators evaluated in three or more samples per subgroup could be considered for meta-regression. For each observed relationship, we tested eight models with the following predictors:

year of publication; mean age of couple; alcohol indicator (alcohol use vs. alcohol problems); time lag between baseline and follow-up assessments; married (predominantly married couples vs. community/other couples); attrition (%); and all seven of the above simultaneously (see Supplemental Material D). When moderators were significant, corresponding scatter plots were provided in Supplemental Material E. Publication bias was tested by inspecting funnel plots with observed and imputed studies (Supplemental Material F), and through calculation of Egger's test of regression to the intercept (Egger, Smith, Schneider, & Minder, 1997; see Table 2).

Two-Stage Meta-Analytic Structural Equation Modeling

To test whether partners' baseline alcohol indicators predicted individuals' follow-up alcohol indicators after controlling for individuals' baseline alcohol indicators, we conducted TS-MASEM (Cheung, 2014; Cheung & Chan, 2005) via the *metaSEM* package for R (Cheung, 2015; Version 3.2: R Core Team, 2013). The first stage in TS-MASEM uses multigroup confirmatory factor analyses to test the homogeneity of correlation matrices across studies and to compute a pooled correlation matrix and an asymptotic covariance matrix. The degree of heterogeneity in each pooled correlation matrix was evaluated by computing Q_T and I^2. A significant Q_T suggests the pooled correlation matrix is heterogeneous and that the variance in weighted mean effect sizes is larger than would be expected due to sampling error (Cheung, 2014). We used random effects, as opposed to fixed effects, so that findings could be generalized beyond the studies included. The second stage in TS-MASEM used the weighted least squares (WLS) estimation to fit path models, estimate parameters, and estimate model fit. Chi-square difference tests (i.e., $\Delta\chi^2$) were used to test if an unconstrained model differed significantly from the more parsimonious constrained model (see Supplemental Material H-J for syntax). The overall group refers to the entire sample of studies (n = 17), a subset of data refers to measures of alcohol use (*n* = 14), and another refers to studies that measured alcohol-related problems[2] (*n* = 5). Following Hu and Bentler (1999), model fit was interpreted using the Comparative Fit Index (CFI; cut off > .95), the Tucker-Lewis Index (TLI; cut off > .95), the Standardized Root Mean Squared Error (SRMR; cut off < .08), and the Root Mean Squared Error of Approximation (RMSEA; cut off < .06).

Results

Sample Characteristics

The final sample consisted of 10,553 couples (21,106 individuals). Mean sample size/study was 621 couples (*SD* = 1,297); women were on average 32.8 years (*SD* = 12.0); men were on average 34.6 years (*SD* = 12.9); the mean time lag between the first and last assessment was 37.1 months (*SD* = 44.3; range: 1 to 144); the attrition rate by the final wave was on average 36.8% (*SD* = 21.5); the mean percentage of Caucasian couples was 71.7% (SD = 27.3); mean relationship length was 9.8 years (*SD* = 10.0); and average year of publication was 2009 (*SD* = 8.17 years). The full characteristics of the final sample appear in Table 1.

Traditional Meta-Analysis

Overall weighted mean effects for the relationships between female and male baseline and follow-up alcohol indicators/alcohol use/alcohol problems appear in Table 2. In brief, baseline female alcohol indicators (referred to as FAI-T1) had small relationships ($r = .29$, $p < .001$) with male follow-up alcohol indicators (referred to as MAI-T2), medium relationships ($r = .35$, $p < .001$) with baseline male alcohol indicators (referred to as MAI-T1), and large relationships ($r = .58$, $p < .001$) with female follow-up alcohol indicators (referred to as FAI-T2). MAI-T1 had small relationships ($r = .29$; $p < .001$) with FAI-T2 and large ($r = .62$; $p < .001$)

[2]Groupings are not mutually exclusive: two studies examined both alcohol use and alcohol-related problems.

relationships with MAI-T2. Finally, MAI-T2 had medium relationships ($r = .37$; $p < .001$) with FAI-T2. The percentage of total heterogeneity across studies ranged from 0.0% to 93.4%, suggesting the possible influence of moderators on certain relationships.

Meta-Regression

Results from random effect meta-regressions appear in Supplemental Material D. After controlling for mean age of couple, alcohol indicator, time lag, married, attrition, and relationship length, year of publication moderated the following relationships: FAI-T1 and MAI-T1 ($\beta = .024$, $p = .001$), MAI-T1 and FAI-T2 ($\beta = .017$, $p = .002$), and FAI-T2 and MAI-T2 ($\beta = .026$, $p = .007$). This suggests FAI-T1's positive relationship with MAI-T1 increased as year of publication increased, as did FAI-T2's positive relationships with MAI-T1 and MAI-T2. Nonetheless, upon inspection of the scatterplot, the moderating effect of year of publication on the relationship between FAI-T1 and MAI-T1 may be driven by outliers and should be interpreted with caution (see Supplemental Material E).

After controlling for other potential moderators, mean age of couple moderated the following relationships: FAI-T1 and MAI-T1 ($\beta = .065$, $p = .002$), and FAI-T2 and MAI-T2 ($\beta = .073$, $p = .009$). This suggests FAI-T1's positive relationship with MAI-T1 increased as mean age of couple increased, as did FAI-T2's positive relationship with MAI-T2. Nonetheless, upon inspection of the scatterplot, it appears the moderating effect of mean age of couple on the relationship between FAI-T1 and MAI-T1 may have been driven by outliers and should be interpreted with caution (see Supplemental Material E).

After controlling for other potential moderators, the alcohol indicator moderated the following relationships: FAI-T1 and MAI-T1 ($\beta = .25$, $p = .002$), FAI-T1 and MAI-T2 ($\beta = .185$, $p = .025$), and FAI-T2 and MAI-T2 ($\beta = .27$, $p = .012$). This implies FAI-T1's positive relationship with MAI-T1 increased when measures of alcohol use as opposed to alcohol problems were employed, as did FAI-T2's positive relationship with MAI-T2, and FAI-T1's positive relationship with MAI-T2.

After controlling for other potential moderators, time lag between assessments moderated the following relationships: FAI-T1 and MAI-T1 ($\beta = -.009$, $p < .001$), FAI-T1 and MAI-T2 ($\beta = -.005$, $p < .001$), MAI-T1 and FAI-T2 ($\beta = -.006$, $p < .001$), and FAI-T2 and MAI-T2 ($\beta = -.009$, $p < .001$). This implies FAI-T1's positive relationship with MAI-T1 and MAI-T2 decreased as time lag increased. FAI-T2's positive relationship with MAI-T1 and MAI-T2 also decreased as time lag increased.

After controlling for other potential moderators, the married variable moderated the following relationships: FAI-T1 and MAI-T1 ($\beta = -.274$, $p = .002$), and FAI-T1 and MAI-T2 ($\beta = -.327$, $p < .001$). This suggests FAI-T1's positive relationships with MAI-T1 and MAI-T2 decreased for samples which were primarily married versus other types of samples (e.g., community samples).

Publication Bias

Funnel plots (Supplemental Material F) and Egger's regression to the intercept (Table 2) provided mixed evidence for publication bias. Egger's regression to the intercept was not significant ($p < .05$) for all observed relationships with the exception of the following relationships: MAI-T1 and MAI-T2, -3.06 [95% CI: -6.71; 0.59], and MAU-T1 and MAU-T2, -4.34 [95% CI: -8.21; -0.47]. However, the "trim and fill" method only increased the estimated relationship between MAI-T1 and MAI-T2 by .02 and the estimated relationship between MAU-T1 and MAU-T2 by .01, suggesting small publication bias but no substantive difference in interpretation (see Table 2).

TS-MASEM Overall Effect Sizes

Estimates of mean correlations between female and male alcohol indicators/alcohol use/alcohol problems at T1 and T2 appear in Supplemental Material C. Longitudinal alcohol indicators' effect estimates were small-to-large (r = .00 to .90) and all but two longitudinal alcohol indicators' effect estimates were positive. FAI-T1 strongly predicted FAI-T2 (β = 0.54, [95% CI: .47; .60]) and MAI-T1 strongly predicted MAI-T2 (β = 0.54, [95% CI: .47; .62]). FAI-T1 predicted MAI-T2, after controlling for MAI-T1 (β = .19, [95% CI.12; .25]) to a small degree. Similarly, MAI-T1 predicted FAI-T2 while controlling for FAI-T1 (β = .12, [95% CI: .06; .18]) to a small degree. The same pattern of results was found for measures of alcohol use (Supplemental Material C). Comparable results were found for measures of alcohol problems except baseline male alcohol problems did not predict female follow-up alcohol problems (see Supplemental Material C). Lastly, the path corresponding to baseline female alcohol problems predicting male follow-up alcohol problems was significantly ($p < .05$) weaker than baseline female alcohol use predicting male follow-up alcohol use.

Q_T was significant for the overall effect of baseline alcohol indicators predicting change in alcohol indicators at follow-up ($Q_T = 381.4$, $p < .001$) and for the overall effect of baseline alcohol use predicting change in alcohol use at follow-up ($Q_T = 365.6$, $p < .001$). In contrast, Q_T was nonsignificant for the overall effect of baseline alcohol problems predicting change in alcohol problems at follow-up ($Q_T = 25.3$, $p > .05$). Lastly, I^2 ranged from medium-to-large for alcohol indicators ($I^2 = 71.8$ to 90.0) and alcohol use ($I^2 = 69.8$ to 91.7). In line with the overall nonsignificant test of heterogeneity, little heterogeneity was found for the alcohol problems weighed effects. Indices of heterogeneity and variance owing to heterogeneity for each group of data are reported in Supplemental Material C.

Model Comparisons

Four models were compared within each group of data (see Table 3 for fit indices) to test the presence and magnitude of partner effects, and any gender differences in effects. Model A was just-identified (*df* = 0) and was used to compare other models. For Model B, the correlation between MAI-T2 and FAI-T2 was constrained to zero. For Model C, the same correlation was constrained to zero, and the path from FAI-T1 to MAI-T2 was constrained to equal the path from MAI-T1 to FAI-T2. Building from Model B, Model C tested whether equating partner effects across genders would result in better fit. For Model D, the correlation between FAI-T2 and MAI-T2 was constrained to zero and the path from FAI-T1 to FAI-T2 was constrained to equal the path from MAI-T1 to MAI-T2. Building from Model B, Model D tested whether equating actor effects (i.e., individual relative stability) across genders would result in better fit. Model B was the best-fitting and selected Model as determined by stand-alone fit indices (CFI, TLI, RMSEA, SRMR) and the chi-square difference test for all data (see Supplemental Figures G1-3). Model B's selection over Model C suggests the magnitude of partner effects vary across genders, with women exerting stronger partner effects on their male partner's alcohol indicators than vice versa (see Figure G1). Next, the male partner effect for alcohol problems was nonsignificant ($p > .05$), suggesting men may not influence their female partner's alcohol problems (see Figure G3). Model B's selection over Model D suggests alcohol use has greater relative stability in women than in men as the female actor effect was significantly stronger than the male actor effect, though the magnitude of this difference was small (see Figure G2). We found the opposite with regards to alcohol-related problems: the male actor effect was significantly stronger ($p < .05$) than the female actor effect, suggesting that alcohol problems are relatively more stable in men (see Figure G3). Model B yielded no significant differences in actor effects on the overall alcohol indicators across genders.

Discussion

The magnitude and gender-specific nature of partner influences on alcohol use required clarification due to some inconsistencies in findings. Furthermore, understanding partner influences on alcohol use could have implications for prevention and treatment efforts. Therefore, we conducted a comprehensive meta-analysis of 17 longitudinal studies examining partner influences in romantic couples. Our best-fitting model allowed both partner and actor effects to vary freely across genders and fit the data well, as evidenced by strong stand-alone and relative goodness-of-fit indices. As hypothesized, results suggested the partner's baseline alcohol use positively predicts the individual's alcohol use (i.e., partner effects), while accounting for the relative stability of alcohol use within the individual (i.e., actor effects). Overall, we found significant partner effects on alcohol use that were small in magnitude; however, given the strong relative stability of alcohol use within an individual, the detection of partner effects that control for actor effects is meaningful as small effects that are positive and consistent may have a cumulative effect over time (Abelson, 1985; Otten et al., 2008).

Gender Differences in Partner Influence

We conducted a subgroup analysis to compare partner influences across measures of alcohol use, and alcohol problems as the former represent a behavior and the latter, consequences of a behavior. We found the female partner effect was stronger than the male partner effect for alcohol use. Additionally, we found a significant female partner effect yet a nonsignificant male partner effect for alcohol-related problems.

Our results contribute to the literature on gender differences in the social context of alcohol use by showing that women exert stronger partner influences than men. Though discordance in heavy drinking among couples is associated with decreased marital satisfaction (Homish & Leonard, 2007), some research suggests couples where only the woman reports heavy drinking are at increased risk of divorce compared to man-only heavy drinking couples (Keenan, Kenward, Grundy, & Leon, 2013; Torvik et al., 2015). Another possible explanation for the gender difference in partner influence pertains to the fact that women engage in lower alcohol consumption than men and that men may shift their drinking to match the lower levels of their female partners (Wilsnack, Wilsnack, Kristjanson, Vogeltanz-Holm, & Gmel, 2009). Engels and Knibbe (2000) found male adolescents shifted their drinking patterns to that of their female romantic partner by drinking less and being intoxicated less often whereas female adolescents exhibited significantly less changes in their drinking patterns after entering a romantic relationship. Taken together, women may influence their male partner's drinking more strongly than the reverse, in either a risky and/or a protective manner.

Next, our moderation analyses suggest women exert less influence within married samples compared to community/other samples. A possible explanation lies within Bowen's family systems theory (1974). Perhaps the alcohol-related roles and expectations for each member of the married couple are more established and therefore more resistant to the women's influence compared to other types of samples. Furthermore, our moderation analyses suggest male partner effects increased as year of publication increased. Women have historically held less power in society; but given shifts in traditional gender-roles observed in North America in recent decades perhaps women, with fewer traditional social constraints on their drinking (Keyes, Grant & Hasin, 2008), are becoming more responsive to male partner influences on their drinking. In fact, there has been a gender convergence in rates of AUDs in recent decades (Keyes et al., 2008). These socio-cultural trends may help explain the publication year effect observed in our meta-analysis. Lastly, we found that both female and male partner effects decreased as the time lag between assessments increased. Though partner influences continue to be significant, it is possible that the predictive power of baseline partner drinking decreases with time as the couple is more likely to experience other sources of influences that may impact their drinking levels (e.g., change in social circles, pregnancy, stressful events).

Our finding that women influence their male partners more strongly than the reverse is consistent with research on the gender differences in alcohol-related problems. Again, a possible explanation pertains to the fact that women experience lower frequencies of alcohol problems than men on average (Bischoff, 2007; Nolen-Hoeksema, 2004); men may shift their drinking to a less problematic style to match that of their female partners. Moreover, it is essential to consider gender differences in the way individuals view their own, and their partner's, drinking behaviors as these differences influence the expected, perceived and actual experiences of alcohol problems (Bischoff, 2007). Research suggests that women are more likely than men to be concerned for their partner's drinking and to attempt to control it. In contrast, their male partners display few concerns about their own drinking (Raitasalo & Holmila, 2005).

We found men influence their female partners' drinking levels, but not their alcohol-related problems. A possible explanation for this lies within the difference between a behavior and a negative consequence. Following social learning theory (Bandura, 1977), a woman may emulate her male partner's heavy drinking after a period of directly observing rewards he obtains from his drinking behaviors. However, given the negative valance of alcohol problems, a woman may be less likely to imitate her husband's problematic drinking. Interestingly, our results revealed men's alcohol problems are still influenced by their female partners' alcohol-related problems. Still, in line with social learning theory, this influence on alcohol problems was weaker than women's influence on men's alcohol use and further moderation analyses were consistent with this conclusion. Differences in the experience of alcohol problems across genders may contribute to the gender difference in partner influence. For instance, Bongers and colleagues (1988) found men reported a greater accumulation of types of alcohol-related problems; men were more likely than women to experience problems with their partner/family, and problems with law enforcement. Moreover, in a review of consequences in college students, Perkins (2002) found male college students' alcohol problems gravitated towards consequences for self and others that involved public deviance, whereas female college students tended to have more personal and private alcohol-related problems. Perhaps the alcohol-related consequences experienced by men are more observably deterring women from emulating those behaviors.

Gender Differences in Actor Effects

In our selected model which allowed actor and partner effects to vary freely, we found the female actor effect to be significantly stronger than the male actor effect for alcohol use. These autocorrelations suggest women may possess greater relative stability in their alcohol use than men. National surveys in the U.S. have similarly reported women's alcohol consumption levels to be more stable than men's over ten years (Kerr, Fillmore, & Bostrom, 2002). Other longitudinal studies suggest heavy drinkers are less stable in their consumption than moderate drinkers and abstainers (Kerr et al., 2002; Knott, Bell, & Britton, 2018). Thus, women's greater stability in alcohol consumption over time may be related to the fact women on average consume less alcohol than men (Wilsnack et al., 2009). However, it is important to interpret our observed gender difference in the magnitude of the actor effect for alcohol use cautiously as the absolute magnitude of this gender difference was very small. Moreover, significant autocorrelations do not signify the absence of change but rather stability in the rank ordering of individuals in that those who reported greater-than-average alcohol use at baseline continue to report greater-than-average alcohol use at follow-up (Caspi, Roberts, & Shiner, 2005). Additionally, we found the male actor effect was stronger than the female actor effect for alcohol-related problems, despite the fact women report lower levels of such problems. This result contrasts previous studies that reported greater relative stability for women (Brennan, Schutte, Moos, & Moos, 2011) or equal stability across the genders (Caetano, 1997). Nonetheless, men may exhibit greater relative stability in alcohol problems that are rooted in dependence as they arise from patterns of heavy alcohol use, which are more likely in men (Caetano, 1997). It is important to interpret our observed gender difference in the magnitude of the actor effect for alcohol problems cautiously, as this group of data was limited to five studies.

Limitations and Future Directions

Alcohol use among individuals was highly stable. As such, the variance available to be accounted for by partner use was relatively small. Moreover, our included studies involved variable time lags (one month to 12 years; see Table 1) and focused primarily on young couples (approximately 63% of couples were under 35 years old, on average). The influence of partners' alcohol use should be studied across different kinds of romantic relationships (e.g., open relationships, long-distance relationships) and across different developmental periods in which commitment and desire to maintain the relationship may differ (e.g., young casually-dating couples, older dating couples). Partner influences should also be studied using longer time lags between measurement points, so there is more variability to predict once baseline levels are controlled. However, the time lag between baseline and follow-up assessment in the included studies in the present meta-analysis ranged from one month to 12 years; therefore, the detection of partner influences over-and-above actor effects over a varied period is noteworthy. Indeed, our analyses revealed time lag as a significant moderator to partner influences.

Furthermore, our included studies lacked consistency regarding the way alcohol indicators were measured. This may have oversimplified the relationship between the partner's baseline alcohol use and the individual's subsequent alcohol use. For example, we were unable to detect subtleties in relation to partner influences and type of alcohol-related problem (e.g., physical vs. interpersonal alcohol-related problems). Next, our test of partner effects controlled for baseline alcohol use but did not account for selection effects prior to the baseline data. We found multiple moderators for the baseline relationships between female and male alcohol indicators (e.g., mean age of couple, measure of alcohol indicator time-lag). It is unclear how these findings would differ if individuals were also assessed prior to their partnerships.

As our included studies were composed exclusively of participants from North America and Western Europe, the extent to which these results generalize to other regions of the world is unclear. Moreover, as the average ages of the samples in our included studies ranged from 15-54 years old, and only one of our 17 included studies involved a secondary/high school student sample, our results may not extend across the lifespan. Next, our results are limited to heterosexual partnerships despite our attempts to search for studies reporting on same-sex couples. Thus, it remains to be determined through future research whether such partner influences are operative in same-sex couples, and whether the observed gender differences are operative in female-female vs. male-male couples or whether they are limited to male-female relationships. Lastly, our results suggested publication bias for two relationships: MAI-T1 and MAI-T2, and MAU-T1 and MAU-T2. Our attempts to address publication bias included incorporating unpublished dissertations into our search strategy, calculating Egger's regression to the intercept, and calculating "trim and effect" adjust estimates (a funnel-plot based method that corrects plot asymmetry among smaller studies) which adjusted the relationships by marginal amounts.

Conclusion

Our meta-analysis represents the most comprehensive test of partner influences on alcohol use to date. Analyses indicated romantic partner alcohol use predicts subsequent alcohol use in an actor for both men and women. Our results demonstrated that romantic partners affect subsequent risky alcohol use behavior in an individual and support the need for partner involvement in alcohol interventions. Indeed, a meta-analysis concluded that behavioral couples therapy yields better outcomes than traditional individual-focused treatments for married or cohabiting individuals seeking help for an AUD (Powers, Vedel, & Emmelkamp, 2008). We found women influenced their male partner's drinking more strongly than men influenced their female partner's drinking (although we also found men's influence increased as year of publication increased). Therefore, lighter partner drinking, particularly lighter drinking in the female partner, may serve as a protective factor against alcohol misuse. Addressing the powerful effects of partner drinking may assist in the modification of individual drinking behavior in the therapeutic context. In contrast, heavier partner drinking may interfere with an individual's treatment for alcohol-use disturbances suggesting the need for treating the couple as a unit. Lastly, couples at most risk of escalating one another's drinking could be identified and targeted for support tailored to the couple's characteristics and needs. Our results further support the need for couples-based interventions and support the involvement of a client's partner when treating AUDs.

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Table 1

Characteristics of longitudinal studies included in the meta-analysis

	N	Sample type	Couple age	Time lag (months)	Attrition %	Caucasian %	Relationship length (years)	Status	Alcohol indicator
Aalsma et al. (2012)	80	Adolescents[1]	15.6	12.0	78.6	89.0	NR	A	Frequency
Bartel et al. (2017)	179	Community[1]	31.0	36.0	39.7	NR	7.45	A	Binge
Buu et al. (2011)	84	Married high-risk parents[2]	32.0	144.0	69.2	100.0	NR	A	DDHQ
Cronkite et al. (1984)	245	Married[2]	45.1	12.0	8.2	82.0	18.7	A	Quantity
Desrosiers et al. (2016)	197	Postpartum couples[1]	20.0	6.0	15.5	11.1	NR	A	Frequency
Hellmuth et al. (2013)	122	Postpartum couples[1]	>18.0[a]	7.0	32.2	79.0	2.9	A	AUDIT
Kehayes et al. (2017)	108	Community University students[1]	22.6	1.0	46.8	83.5	2.3	A	Quantity Frequency RAPI–7D[c]
Keller et al. (2009)	98	Married[2]	39.0	24.0	38	67.0	13.0[b]	A	MAST ADS
Leonard & Eiden (1999)	491	Married[2]	23.4	12.0	23	75.0	1.0	A	Quantity Binge INTX

Leonard & Mudar (2004)	468	Married[2]	27.9	12.0	26	62.0	1.0	A	Quantity Binge INTX
Mahedy et al. (2017)	5,535	Postpartum couples[1]	NR	96.0	60.3	NR	NR	A	Quantity Binge
Mushquash et al. (2013)	208	University /post-secondary students[1]	21	1.0	2.9	88.9	1.8	A	Binge
Otten et al. (2008)	404	Married[2]	45	24.0	6.0	100.0	NR	A	Quantity
Rodriguez (2014)	61	Married[2]	29.8	6.0	50.4	69.6	6.00	A	Quantity Frequency RAPI AUDIT
Rogers (2002)	1,182	Married elderly sample[2]	55.9	72.0	30.8	88.4	30.0	D	Quantity
Temple et al. (2008)	468	High-risk couples[1]	33.3[d]	45.0	35.1	32.7	7.7	A	Frequency
Windle et al. (2014)	489	Married[2]	51.4	120.0	42.0	99.0	26.07	A	QFI Binge

Note. Couple age, % Caucasian, and relationship length for the sample at baseline; Attrition by the last wave; Time lag is expressed in months; Relationship length is expressed in years; [1]Community/Other sample type and [2]Married sample type; **NR** = not reported; ***N*** =

total number of couples used for the analyses; **Status** = publication status of the study: **A** = article; **D** = dissertation; **QFI** = quantity-frequency index (Armor & Polich, 1982); **Binge** = binge drinking frequency; **INTX** = frequency of intoxication; **DDHQ** = alcohol problems items of the Drinking and Drug History Questionnaire (Zucker, Fitzgerald, & Noll, 1990); **AUDIT** = Alcohol Use Disorders Identification Test (Saunders, Aasland, Babor, De La Fuente, & Grant, 1993); **RAPI** = Rutgers Alcohol Problem Index (White & Labouvie, 1989; refers to a one year time period); **RAPI-7D** = Rutgers Alcohol Problem Index over the past 7 days; **ADS** = Alcohol Dependence Scale (Skinner & Horn, 1984); **MAST** = Michigan Alcohol Screening Test (Selzer, M. 1971).
[a]participants were all over the age of 18
[b]years living together
[c]RAPI-7 day is reported in Lambe et al. (2015), a subsample of Kehayes et al. (2017)
[d]only one partner's age is reported

Table 2

Summary of overall bivariate effect sizes for the relationships between female and male baseline and follow-up alcohol indicators, alcohol use, and alcohol problems

Variable	k	N	r^+	95% CI	Q_T	I^2 (%)	Egger's intercept	95% CI	k^{TF}	"Trim and fill" estimates r^+ [95% CI]
Alcohol indicators–women, T1										
Alcohol indicators–women, T2	17	10,382	.58***	[.52; .63]	196.45***	91.86	0.30	[-2.69; 3.29]	0	.58 [.52; .63]
Alcohol indicators–men, T1	17	6,367	.35***	[.29; .42]	128.96***	87.59	-2.10	[-5.70; 1.49]	0	.35 [.29; .42]
Alcohol indicators–men, T2	18	5,053	.29***	[.22; .35]	92.70***	92.70	-2.46	[-5.04; 0.13]	0	.29 [.22; .35]
Alcohol indicators–women, T2										
Alcohol indicators–men, T1	18	5,053	.29***	[.22; .35]	88.29***	80.75	-0.77	[-3.56; 2.03]]	0	.29 [.22; .35]
Alcohol indicators–women, T1	16	4,734	.37***	[.30; .44]	95.73***	95.73	-0.50	[-3.79; 2.80]	0	.37 [.30; .44]
Alcohol indicators–men, T1										
Alcohol indicators–men, T2	16	4,847	.62***	[.56; .67]	133.26***	88.74	-3.06	[-6.71; 0.59]	1	.60 [.54; .66]
Alcohol use–women, T1										
Alcohol use–*w*omen, T2	15	10,213	.58***	[.52; .64]	192.30***	92.72	0.41	[-3.10; 3.92]	0	.58 [.52; .64]
Alcohol use–men, T1	14	5,976	.38***	[.31; .44]	110.68***	88.26	-1.34	[-5.91; 3.23]	0	.38 [.31; .44]
Alcohol use–men, T2	14	4,678	.32***	[.28; .38]	76.83***	83.08	-1.86	[-5.50; 1.78]	0	.32 [.28; .38]
Alcohol use–women, T2										
Alcohol use–men, T1	14	4,678	.31***	[.24; .38]	82.77***	84.29	-0.06	[-4.03; 3.91]	0	.31 [.24; .38]
Alcohol use–men, T2	13	4,481	.40***	[.32; .47]	87.74***	86.32	0.56	[-3.83; 5.00]	0	.40 [.32; .47]
Alcohol use–men, T1										
Alcohol use–men, T2	14	4,678	.61***	[.55; .66]	118.01***	88.98	-4.34	[-8.21; -0.47]	1	.60 [.53; .65]
Alcohol-related problems–women, T1										
Alcohol-related problems–women, T2	2	169	.57***	[.32; .74]	3.67	72.76	—	—	—	—
Alcohol-related problems–men, T1	3	391	.21**	[.07; .33]	3.57	43.90	2.56	[-111.38; 116.50]	0	.21 [.07; .33]
Alcohol-related problems–men, T2	4	375	.16**	[.05; .26]	3.52	14.70	-4.83	[-20.66; 10.99]	0	.16 [.05; .26]
Alcohol-related problems–women, T2										
Alcohol-related problems–men, T1	4	375	.19***	[.09; .29]	0.66	0.00	-1.33	[-9.74; 7.09]	0	.19 [.09; .29]
Alcohol-related problems–men, T2	3	253	.24***	[.13; .35]	1.61	0.00	-5.50	[-40.44; 29.44]	0	.24 [.13; .35]
Alcohol-related problems–men, T1										
Alcohol-related problems–men, T2	2	169	.70**	[.23; .90]	15.25***	93.44	—	—	—	—

Note. Overall bivariate effects estimates for all available alcohol outcomes, including alcohol use and alcohol-related problems; **Female Alcohol Indicators** = averaged female partner alcohol indicators; **Male Alcohol Indicators** = averaged male partner alcohol indicators; **Female Alcohol**

Use = averaged female partner alcohol use; **Male Alcohol Use** = averaged male partner alcohol use; **Female Alcohol problems** = averaged female partner alcohol-related problems; **Male Alcohol problems** = averaged male partner alcohol-related problems; **TI** = averaged baseline; **T2** = averaged follow-up; ***k*** = number of studies; ***N*** = total number of participants in the *k* samples; $\boldsymbol{r^+}$ **=** observed weighted mean correlation; ***CI*** = confident interval for r^+; $\boldsymbol{Q_T}$ = measure of heterogeneity for r^+; $\boldsymbol{I^2}$ = percentage of heterogeneity for r^+; $\boldsymbol{k^{TF}}$ = number of imputed studies as part of "trim and fill" method for r^+.
$^*p < .05$; $^{**}p < .01$; $^{***}p < .001$.

Table 3

Model comparison fit indicies for overall, alcohol use, and alcohol problems data

Stage/Model	*k*	*N*	χ^2	*df*	*p*	CFI	TLI	SRMR	RMSEA [95% CI]	$\Delta\chi^2$
Overall										
Model 1A	17	10,419	0.00	0	—	—	—	—	—	—
Model 1B	**17**	**10,419**	**1.24**	**1**	**.265**	**.999**	**.999**	**.011**	**.005 [.000, .027]**	**1.24(1)**
Model 1C	17	10,419	32.52	2	<.001	.973	.920	.069	.038 [.027, .050]	32.52^{***}(2)
Model 1D	17	10,419	53.57	2	<.001	.954	.864	.082	.050 [.039, .062]	53.57^{***}(1)
Measures of alcohol use										
Model 2A	14	10,115	0.00	0	—	—	—	—	—	—
Model 2B	**14**	**10,115**	**3.02**	**1**	**.082**	**.998**	**.989**	**.018**	**.014 [.000, .034]**	**3.02(1)**
Model 2C	14	10,115	26.46	2	<.001	.977	.932	.065	.035 [.024, .047]	24.46^{***}(2)
Model 2D	14	10,115	43.90	2	<.001	.961	.884	.081	.046 [.034, .058]	43.90^{***}(1)
Measures of alcohol-related problems										
Model 3A	5	473	0.00	0	—	—	—	—	—	—
Model 3B	**5**	**473**	**0.73**	**1**	**.705**	**.999**	**.999**	**.013**	**.000 [.000, .000]**	**0.73(1)**
Model 3C	5	473	11.71	2	.003	.933	.800	.108	.101 [.051, .161]	11.71^{**}(2)
Model 3D	5	473	16.81	2	<.001	.898	.695	.092	.125 [.075, .184]	16.81^{***}(1)

Note. ***p*** = p value of x^2. Overall refers to all alcohol indicators (AI); **Model 1A** = no degrees of freedom; **Model 1B** = correlation between FAI-T2 and MAI-T2 constrained to 0; **Model 1C** = correlation between FAI-T2 and MAI-T2 constrained to 0 and path from FAI-T1 to MAI-T2 constrained to equal path from MAI-T1 to FAI-T2; **Model 1D** = correlation between FAI-T2 and MAI-T2 constrained to 0 and path from FAI-T1 to FAI-T2 constrained to equal path from MAI-T1 to MAI-T2. The model selected is in bold. **Model 2A** = no degrees of freedom; **Model 2B** = correlation between FAU-T2 and MAU-T2 constrained to 0; **Model 2C** = correlation between FAU-T2 and MAU-T2 constrained to 0 and path from FAU-T1 to MAU-T2 constrained to equal path from MAU-T1 to FAU-T2; **Model 2D** = correlation between FAU-T2 and MAU-T2 constrained to 0 and path from FAU-T1 to FAU-T2 constrained to equal path from MAU-T1 to MAU-T2. The model selected is in bold. **Model 3A** = no degrees of freedom; **Model 3B** = correlation between FARP-T2 and MARP-T2 constrained to 0; **Model 3C** = correlation between FARP-T2 and MARP-T2 constrained to 0 and path from FARP-T1 to MARP-T2 constrained to equal path from MARP-T1 to FARP-T2; **Model 3D** = correlation between FARP-T2 and MARP-T2 constrained to 0 and path from FARP-T1 to FARP-T2 constrained to equal path from MARP-T1 to MARP-T2. The model selected is in bold.